require (for a four die stack) something less than 4×18=72 leads, while parallel connections would require something on the order of 22 or more pins, depending on the type of devices and system requirements. The final packages can be in the form of a small outline J-leaded (SOJ) package, a dual in-line package (DIP), a single in-line package (SIP), a plastic leaded chip carrier (PLCC), and a zig-zag in-line package (ZIP).

While a preferred embodiment of the invention has been disclosed, various modes of carrying out the principles disclosed herein are contemplated as being within the scope of the following claims. Therefore, it is understood that the scope of the invention is not to be limited except as otherwise set forth in the claims.

Subt a2

What is claimed is:

1. A multiple-die low-profile semiconductor device comprising:
   a. a lead-frame paddle supported by a lead frame;
   b. a controlled, first, thin-adhesive layer of about 0.001 inches affixing a first die above the paddle;
   c. a plurality of thin wires having a first low-loop wire bond to a plurality of first diebonding pads, said wire bond having a wire height above the bonding pad of about 0.006 inches, and a second wire bond to a plurality of adjacent lead-frame lead fingers;
   d. a second thin-adhesive layer of about 0.008 inches affixing a second die above the first die;
   e. a second plurality of thin wires having low-loop wire bonds to a plurality of second die-bonding pads and second wire bonds to the plurality of lead fingers;
   f. two additional dies affixed above the second die by additional subsequent layers of adhesive of about 0.008 inches and having additional thin wires bonded to additional bonding pads and lead fingers; and
   g. an encapsulated layer surrounding all dies, adhesive layers, and thin wires wherein a total encapsulated-package height is about 0.110 inches.

2. A multiple-die low-profile semiconductor device comprising:
   a. a lead-frame paddle supported by a lead frame;
   b. a controlled, first, thin-adhesive layer of about 0.001 to 0.005 inches affixing a first die above the paddle;
   c. a plurality of thin wires having a first low-loop wire bond to a plurality of first die-bonding pads, said low-loop wire ball bond having a wire height above the bonding pads of about 0.006 inches and a second wire bond to a plurality of adjacent lead-frame lead fingers;
   d. a second thin-adhesive layer of about 0.008 to 0.010 inches affixing a second die above the first die;
   e. a second plurality of thin wires having low-loop wire bonds to a plurality of second die-bonding pads and second wire bonds to the plurality of lead fingers;
   f. an encapsulated layer surrounding all die adhesive layers and thin wires wherein a total encapsulation-layer height is about 0.070 inches.

* * * * *

3. A method for fabricating a multiple-die, low-profile semiconductor device, comprising:

a. providing a lead frame having a lead frame paddle and a plurality of lead fingers;

b. affixing to said paddle a first die having a plurality of first die-bonding pads;

c. connecting bond wires between each of said plurality of first die-bonding pads and corresponding lead fingers of said plurality of lead fingers by way of a low-loop wire bond on each of said plurality of first die-bonding pads and a wire bond on each of said corresponding lead fingers;

d. affixing to said first die, following said connecting bond wires, a second die having a plurality of second die-bonding pads;

e. connecting bond wires between each of said plurality of second die-bonding pads and corresponding lead fingers of said plurality of lead fingers by way of a low-loop wire bond on each of said plurality of second die-bonding pads and a wire bond on each of said corresponding lead fingers; and

f. affixing two additional dies above said second die.

4. The method of claim 3, further comprising encapsulating all dies and bond wires with an encapsulation layer having a height of about 0.110 inches.

5. The method of claim 3, wherein die-bonding pads of said first plurality of die-bonding pads are connected to said corresponding lead fingers of said plurality of lead fingers in parallel with die-bonding pads of said second plurality of die-bonding pads.

6. The method of claim 3, wherein die-bonding pads of said first plurality of die-bonding pads and die-bonding pads of said second plurality of die-bonding pads are each connected to individual ones of said plurality of lead fingers.

7. The method of claim 3, wherein said providing comprises providing a lead frame having a downset lead frame paddle and a plurality of lead fingers upset relative to said downset lead frame paddle.

8. The method of claim 3, wherein said connecting bond wires between each of said first and second pluralities of die-bonding pads and corresponding ones of said lead fingers comprises forming said low-loop wire bonds on each of said die-bonding pads to be ball bonds.

9. The method of claim 3, wherein said connecting bond wires between each of said first and second pluralities of die-bonding pads and corresponding ones of said lead fingers comprises forming said wire bonds on each of said corresponding lead fingers to be wedge bonds.

10. The method of claim 3, wherein said affixing said first die to said lead frame paddle comprises disposing a layer of adhesive between said lead frame paddle and said first die.

11. The method of claim 10, wherein said disposing said layer of adhesive comprises forming said layer of adhesive to be about 0.001 inches thick.

12. The method of claim 3, wherein said affixing said second die to said first die comprises disposing a layer of adhesive between said first die and said second die.